ELECTRONICS

7984

COMPACTRON BEAM PENTODE

FOR RADIO-FREQUENCY POWER AMPLIFIER APPLICATIONS

DESCRIPTION AND RATING

The 7984 is a compactron beam pentode designed for use as a radio-frequency power amplifier in mobile communications equipment. In this service, it is capable of delivering a power output of 46 watts* at 175 megacycles.

Features of the 7984 include a single-ended construction, low seated height, short internal leads, multiple cathode and screen connections, and low driving-power requirements.

GENERAL

ELECTRICAL

Cathode - Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC‡	13.5±1.5	Volts
Heater Current§	0.58	Amperes

Direct Interelectrode Capacitances¶

Grid-Number 1 to Plate: (g1 to p)	0.16	pf
Input: g1 to (h + k + g2 + b.p.)	16	pf
Output: p to (h + k + g2 + b.p.)	6.0	pf

MECHANICAL

Operating Position - Any
Envelope - T-12, Glass
Base - E12-74, Button 12-Pin
Outline Drawing - EIA 12-56

Maximum Diameter	1.563	Inches
Maximum Over-all Length	2.875	Inches
Maximum Seated Height	2.500	Inches

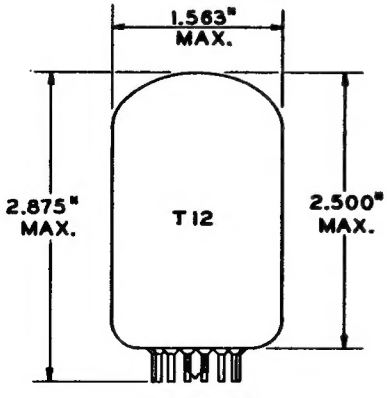
MAXIMUM RATINGS

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

PHYSICAL DIMENSIONS

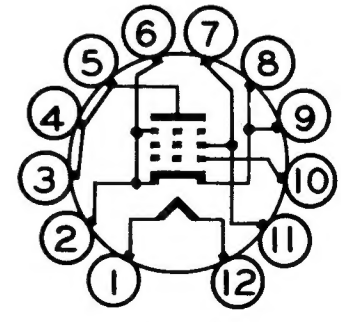


EIA 12-56

TERMINAL CONNECTIONS

Pin 1 - Heater
Pin 2 - Cathode and Beam Plates
‡‡Pin 3 - Plate
‡‡Pin 4 - Plate
‡‡Pin 5 - Plate
Pin 6 - Cathode and Beam Plates
Pin 7 - Grid Number 2 (Screen)
Pin 8 - Cathode and Beam Plates
Pin 9 - Cathode and Beam Plates
Pin 10 - Grid Number 1
Pin 11 - Grid Number 2 (Screen)
Pin 12 - Heater

BASING DIAGRAM



EIA 12EU

GENERAL ELECTRIC

MAXIMUM RATINGS (Cont'd)

RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY AND RADIO-FREQUENCY POWER AMPLIFIER—CLASS C FM TELEPHONY

ABSOLUTE-MAXIMUM VALUES

	CCS#	ICAS△	IMS**	
DC Plate Voltage	600	750	750	Volts
DC Screen Voltage	250	250	250	Volts
DC Grid-Number 1 Voltage	-100	-100	-100	Volts
DC Plate Current	150	150	180	Milliamperes
DC Grid-Number 1 Current	6.0	6.0	6.0	Milliamperes
Screen Input	3.0	3.0	3.0	Watts
Plate Dissipation	20	25	35	Watts
Peak Heater-Cathode Voltage				
Heater Positive with Respect to Cathode	100	100	100	Volts
Heater Negative with Respect to Cathode	100	100	100	Volts
Bulb Temperature at Hottest Point	220	220	220	C

CHARACTERISTICS AND TYPICAL OPERATION

AVERAGE CHARACTERISTICS

Plate Voltage	200	Volts
Screen Voltage	125	Volts
Grid-Number 1 Voltage	-7.5	Volts
Plate Current	125	Milliamperes
Screen Current	4.5	Milliamperes
Transconductance	13500	Micromhos

TYPICAL OPERATION AS CLASS C AMPLIFIER

	CCS#	ICAS△	IMS**	
Frequency	175	175	175	Megacycles
DC Plate Voltage	315	375	450	Volts
DC Screen Voltage	165	160	200	Volts
DC Grid-Number 1 Voltage, approximate	-74	-80	-60	Volts
Grid-Number 1 Resistor	20000	20000	15000	Ohms
DC Plate Current	150	150	180	Milliamperes
DC Screen Current	8.5	8.5	12	Milliamperes
DC Grid-Number 1 Current, approximate	3.7	4	4	Milliamperes
Driving Power, approximate	2	2	2	Watts
Power Output, approximate*	26.5	32	46	Watts

NOTES

* This is the power output of the tube. Power output measured at the load will be less because of tank-circuit losses.

‡ The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.

§ Heater current of a bogey tube at Ef = 13.5 volts.

¶ Without external shield.

\# Continuous Commercial Service (CCS) is defined as that type of service in which normal tube life and reliability of performance under continuous operating conditions are the prime consideration.

△ Intermittent Commercial and Amateur Service (ICAS) is defined to include the many applications where the transmitter design factors of minimum size, light weight, and considerably increased power output are more important than long tube life. In this service, life expectancy may be one-half that obtained in Continuous Commercial Service.

Under the ICAS classification are such applications as the use of tubes in amateur transmitters, and the use of tubes in equipment where transmissions are of intermittent nature. The term "intermittent" is used to identify operation conditions in all applications other than amateur in which no operating or "on" period exceeds 5 minutes and every "on" period is followed by an "off" or standby period of at least the same or greater duration.

NOTES (Cont'd)

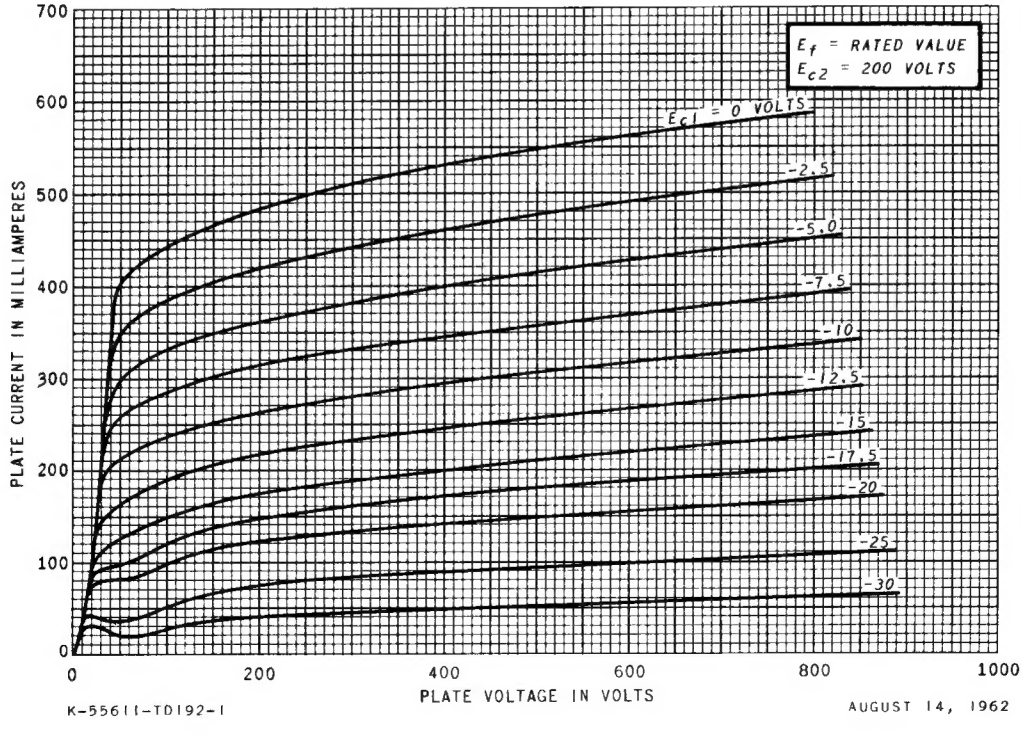
** Intermittent Mobile Service (IMS) is defined to include those applications, such as aircraft, where the transmitter design factors of minimum size, light weight, and exceedingly high power output for short intervals are the primary requirements, even though the average life expectancy of tubes used in such transmitters is reduced. Tube ratings for IMS service are established on the basis that the transmissions have maximum "on" periods of 15 seconds followed by "off" periods of at least 60 seconds, except that it is permissible to make equipment tests with maximum "on" periods of 5 minutes followed by "off" periods of at least 5 minutes provided the total "on" time of such periods does not exceed 10 hours during the life of any tube.

Although the use of tubes under IMS ratings involve great reduction in tube life, such use can be justified as economical practice in applications where high power is intermittently desired for small tubes.

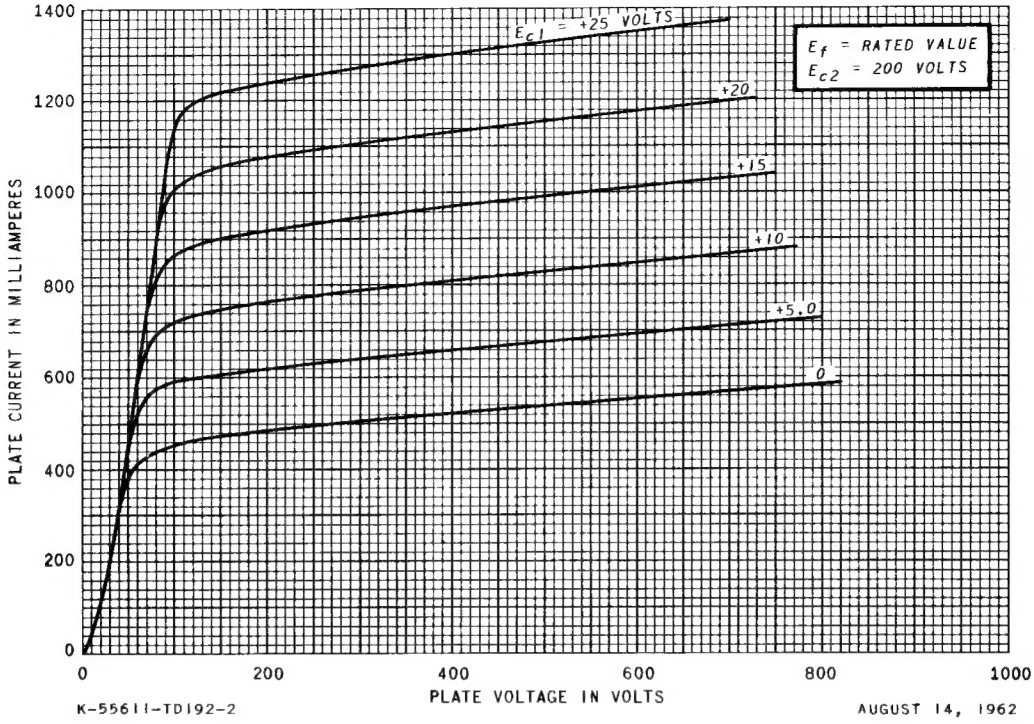
‡‡ Socket contacts for these three pins should be connected together.

The tubes and arrangements disclosed herein may be covered by patents of General Electric Company or others. Neither the disclosure of any information herein nor the sale of tubes by General Electric Company conveys any license under patent claims covering combinations of tubes with other devices or elements. In the absence of an express written agreement to the contrary, General Electric Company assumes no liability for patent infringement arising out of any use of the tubes with other devices or elements by any purchaser of tubes or others.

AVERAGE PLATE CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS



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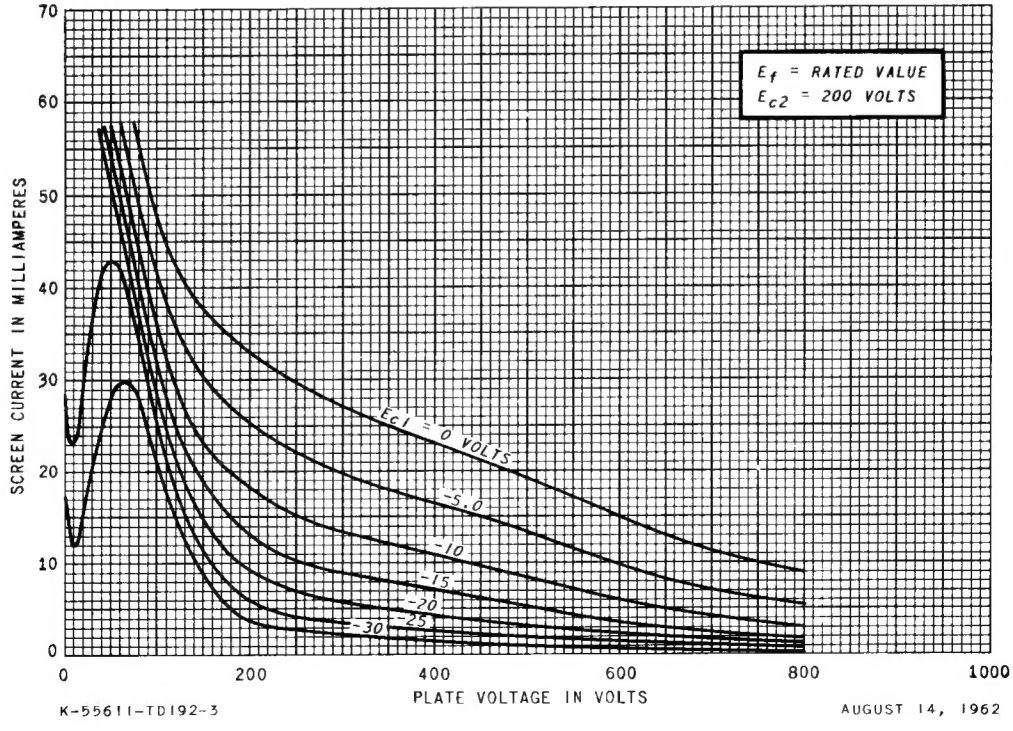

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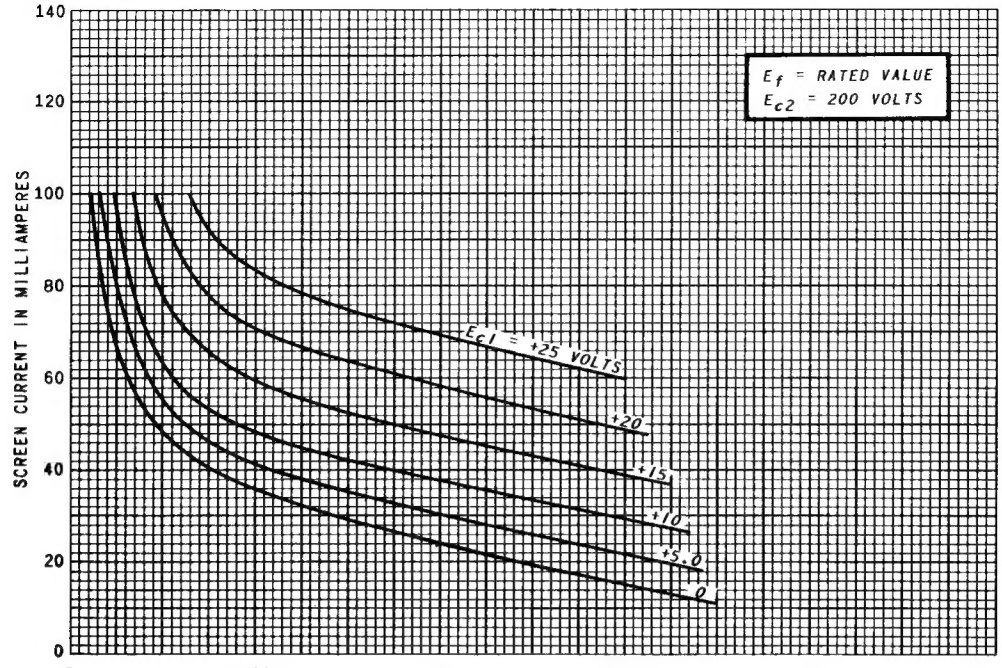
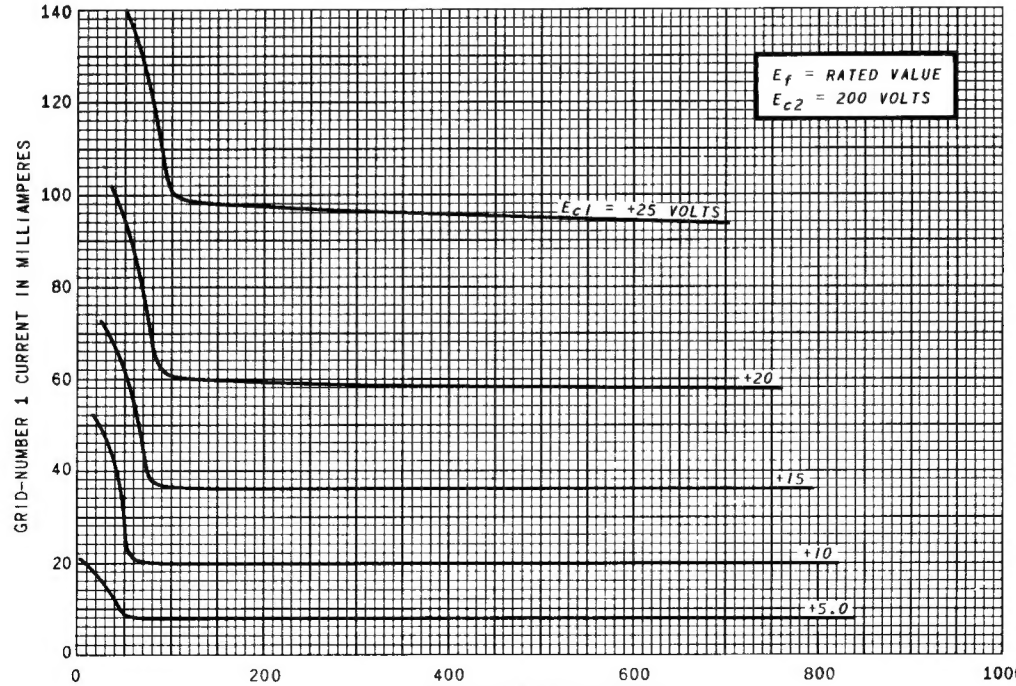


K-55611-TD192-4

AUGUST 14, 1962

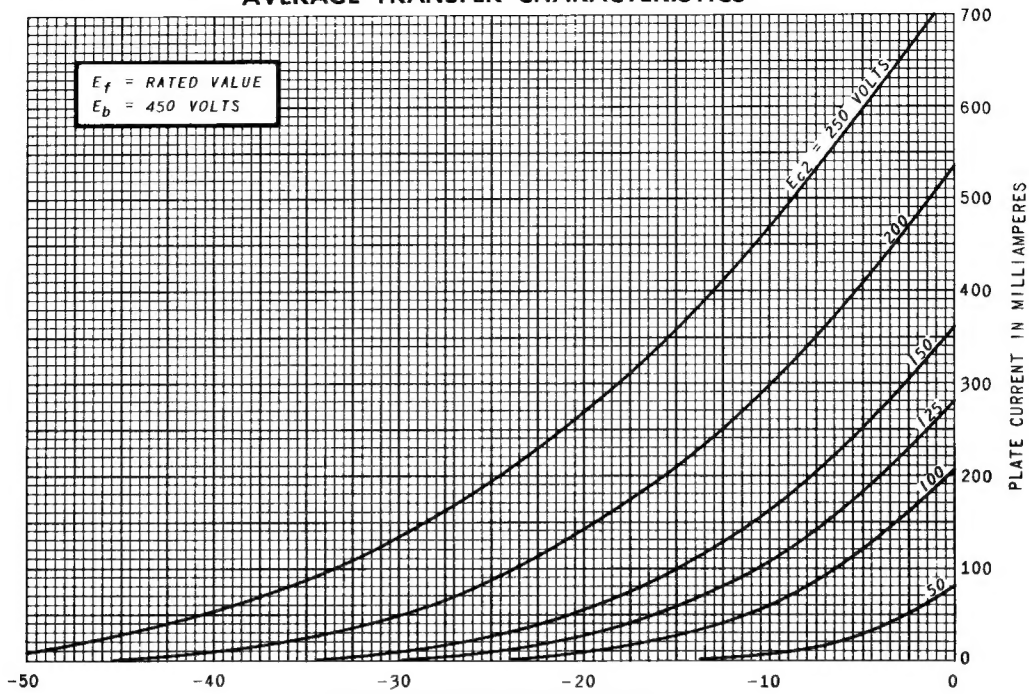
AVERAGE CHARACTERISTICS



K-55611-TD192-5

AUGUST 14, 1962

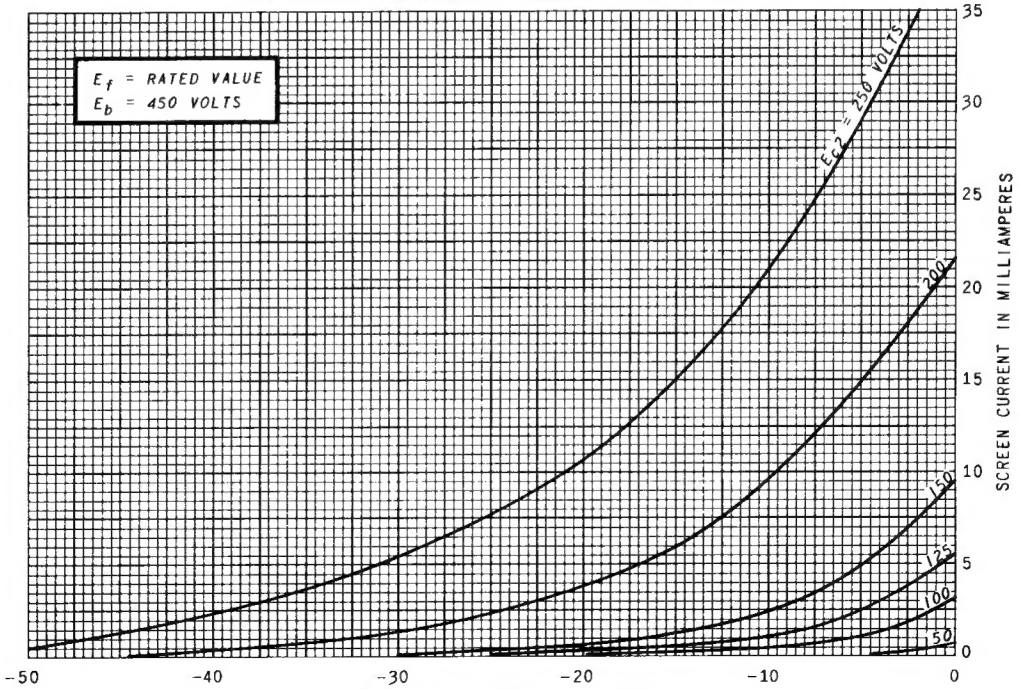
AVERAGE TRANSFER CHARACTERISTICS



K-5561I-TDI92-6

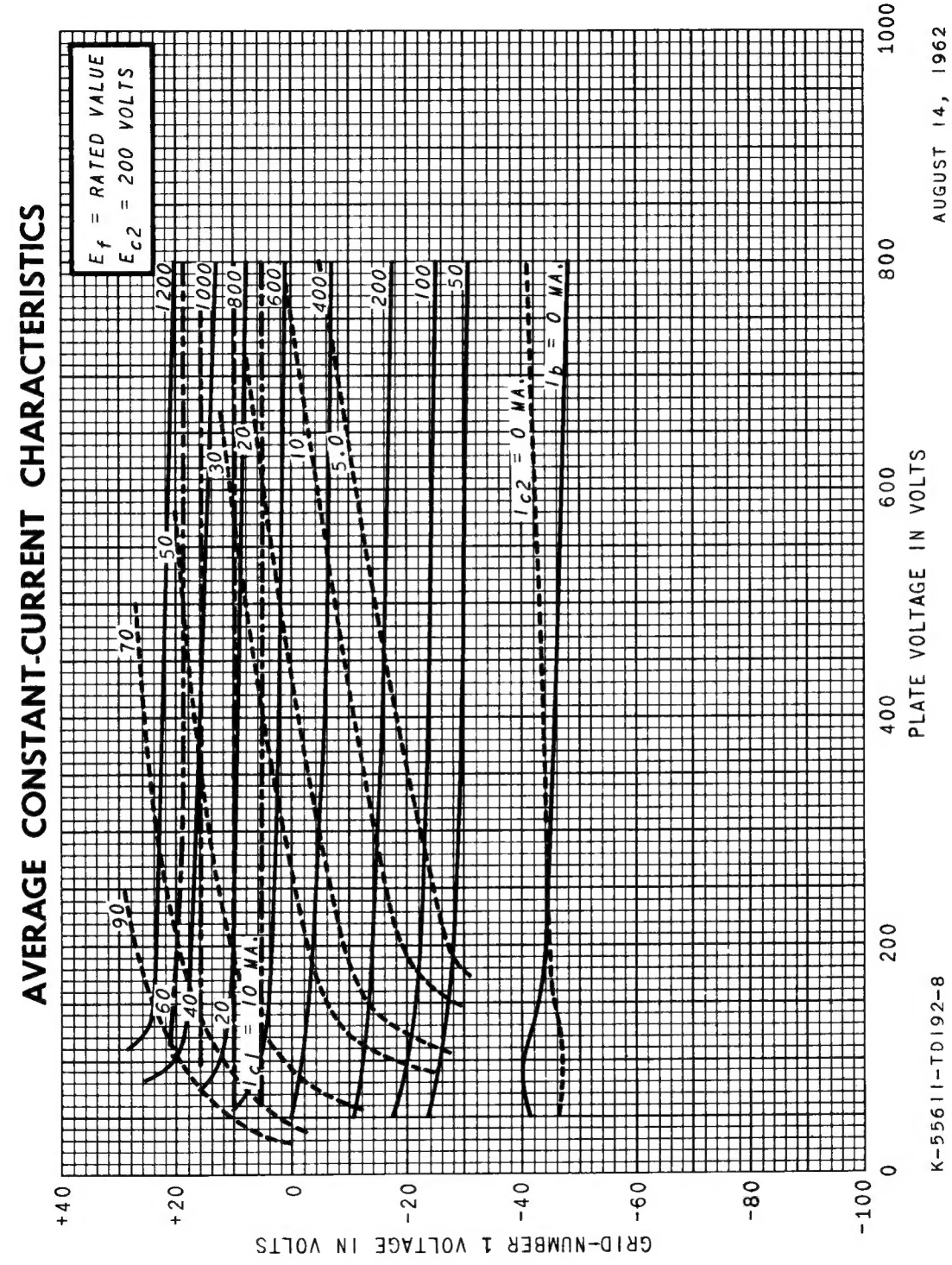
AUGUST 14, 1962

AVERAGE TRANSFER CHARACTERISTICS



K-5561I-TDI92-7

AUGUST 14, 1962


AVERAGE CONSTANT-CURRENT CHARACTERISTICS
E_f = RATED VALUE
E_{c2} = 200 VOLTS
I_{c1} = 10 MA.
I_{c2} = 0 MA.
I_b = 0 MA.
1200
1000
800
600
400
200
100
50
90
70
60
50
40
30
20
10
5.0
+40
+20
0
-20
-40
-60
-80
-100
0
200
400
600
800
1000
GRID-NUMBER 1 VOLTAGE IN VOLTS
PLATE VOLTAGE IN VOLTS
AUGUST 14, 1962
K-5561I-TD192-8

TUBE DEPARTMENT

GENERAL ELECTRIC

Owensboro, Kentucky